SECTION 15400

PLUMBING SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included: This Section specifies plumbing systems. Applicable requirements of Section 15050 - BASIC MATERIALS AND METHODS FOR MECHANICAL WORK apply to the Work of this Section.

B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 07840 – FIRESTOPPING

1.2 SUBMITTALS

A. Shop Drawings

1. Show complete details for installation of materials and each item of equipment.

2. Include details of controls and instrumentation wiring, where applicable.

B. Working Drawings: Show layout and complete details for piping installation, including hangers, supports and anchors.

C. Manufacturers' Literature: Submit for each different type material or product complete descriptions, and catalog data that indicates makes, types, and trade designations, including wiring diagrams and performance curves where applicable.

D. Operations and Maintenance Data: Submit operating and maintenance instructions for each different type of equipment provided.

1.3 QUALITY ASSURANCE

A. Protect unfinished work at the end of each workday from damage and contamination and moisture by the use of plugs, caps or covers.

B. Following cleaning and sterilization of the water piping system provide proper protection against any contamination. Where any contamination is admitted to the system, or when the safe status of the sterilization is voided for any reason, completely re-sterilize the system and obtain acceptance of the Engineer prior to further use.

C. Do not use installed fixtures and equipment, except for testing.

D. Provide adequate protection of chemicals used for the work, to prevent injury to personnel or damage to the system and fixtures.

E. Instruct personnel in use, handling and storage of hazardous chemical products.

F. Provide necessary washdown facilities for neutralizing effects of chemicals, which are improperly used or handled, or accidentally contacted.

G. Protect personnel from damage or injury from hot water system faults during installation and testing.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver fixtures and trim to construction site in original packing crates or boxes, packaged in a manner that will give adequate protection to contents and preserve article in original condition.

B. Handle fixtures carefully to prevent surface damage or breakage during unpacking, storage and installation.

C. Cover installed and stored fixtures to protect against damaged by dirt, water, chemicals and mechanical injury.

1.5 QUALITY CONTROL

A. Requirements of Regulatory Agencies: The work under this Section shall conform to applicable requirements of the Massachusetts State Plumbing Code.

PART 2 – PRODUCTS

2.1 PIPING AND FITTINGS

A. Sanitary Sewer, Waste and Vent

1. Two inches and Larger Above Ground: Class A, C, D, E or J
2. One and One-half inches and Smaller Above Ground: Class J or R
3. Below Ground or In Concrete: Class C or D

B. Drain

1. Above ground: Class A, C or D
2. Below Ground: Class C or D

C. Hot and Cold Water

1. Above Ground: Class K, L or M

2. Below Ground: Class K

D. Natural Gas: Class T

E. Compressed Air: Class U

2.2 STAINLESS STEEL SINKS

A. Nickel stainless steel, 18-gauge minimum, non-magnetic and corrosion resistant, burnished to soft satin finish. Undercoat sink metal with accepted sound dampening compound.

2.3 METALS AND FINISHES

A. Metal Parts: Use metal parts of brass with chromium plating on exposed surfaces except as follows:

1. Metals and finishes specified elsewhere herein.

2. Brackets, hangers and other supports for fixtures, provided they are located not to be normally subject to sight or contact by the user after installation, and not to cause stains on wall and fixture surfaces.

B. Chromium Plated Finish: Smooth plated surface, plated to produce durable, adherent, uniform finish free from blisters, pits and other surface defects with a bright or polished finish on exposed surfaces.

2.4 FITTINGS AND TRIM

A. Chrome plated brass having exposed threads chrome plated, unless otherwise specified.

B. Provide fittings with name or registered trade mark of manufacturer legibly cast or stamped thereon.

2.5 WATER CLOSET

A. General: FS WW-P-541/ 1A.

B. Water Closet: Type II, Style D, Class 9, wall mounted, vitreous china, 1-1/2 inch top spud

C. Flush Valve: Type I, Style 1, Model A with water saver, supply control valve having non-hold open feature, tamper-proof trim wall plate, backflow preventer, flush pipe and escutcheon for inlet spud.

D. Seat: Type IV, Class 4, black, with stainless steel check hinge

2.6 URINALS

A. General: FS WW-P-541/2A, vitreous china, Type 1, Style A, Class 1

B. Flush Valve: Type 1, Style A, Class 1 with water saver, supply control valve having non-hold open feature, tamper-proof trim, wall plate, backflow preventer, flush pipe and escutcheon for inlet spud.

2.7 LAVATORIES AND FITTINGS

A. General: FS WW-P-541/4A, enameled cast iron, Type I, wall mounted

B. Dimensions: Width, 20 inches; length from wall, 18 inches

C. Lavatory Outfit: Type III combination supply and drain fittings with pop-up waste, suitably adapted to fixture, with replaceable valve seats, 2.5 gpm delivery and 0.5 gpm restrictor for hot water, grid drain with tail piece, "P"-trap with clean-out supply assembly with loose key stops.

2.8 WHEELCHAIR LAVATORIES AND FITTINGS

A. General: FS WW-P 541/4A, vitreous china, Type V, Class 4, wall mounted

B. Dimensions: Width, 20 inches; length from wall, 27 inches

C. Lavatory Outfit: Type III gooseneck supply fitting having four-inch control handles, aerator, loose key stops, 2.5 gpm delivery, 0.5 gpm restrictor for hot water, “P”-trap with cleanout plug.

2.9 WALL-MOUNTED SERVICE SINKS

A. FS WW-P-541/5A, Type II, Class 1, Mounting E, enameled cast iron, 22 by 18 inches, plain back, rim guard, combination faucet with vacuum breaker, bracket hook, top spout brace to wall, adjustable union coupling with loose key stops, "P”-trap with three-inch outlet and strainer.

2.10 FLOOR-MOUNTED SERVICE SINKS

A. FS WW-P-541/5A, Type II, Class 1, Mounting D, enameled cast iron, corner type removable vinyl-coated rim guard, 28 inches square, with combination faucet with vacuum breaker, bracket hook, top spout brace to wall, adjustable union coupling with loose key stops.

2.11 CHAIR SUPPORTS FOR WALL HUNG FIXTURES

A. Water Closets: FS WW-P-541/1A, Type II.

1. Fully adjustable both vertically and horizontally, supporting fixtures so that no part of fixture will be supported by wall or partition.

2. Provide carrier with threaded outlet connection for four-inch pipe and with adjustable brass sleeve, gasket-fastening bolts to suit installation, cap nuts and washers.

B. Urinals: Metal chair carriers, full-length in-the-wall type, same as specified above for water closets.

C. Lavatories: FS WW-P-541/4A with chair carrier with concealed arm supports and legs to floor.

2.12 SHOWER, INDIVIDUAL

A. General: Safety-mix, non-scald shower valve, ball joint showerhead, arm and 3.0-gpm restrictor.

C. Accessories: Precast terrazzo receptor 36 inches square, with integral threshold, flange cast integral of galvanized-bonderized steel, stainless steel strainer and drain connection to caulk two-inch iron pipe, metal soap dish and plastic curtain with hooks and rod.

2.13 SHOWER, GROUP

A. General: Stainless steel Type 304, 16 gauge column for three users, 16 gauge cap, 13 gauge base flange, cast-iron drain fitting with mounting bolts and an access door in lower portion of column.

B. Accessories: Vandal-proof shower heads with 3 gpm restrictors, circular soap tray, control valves, mixing chamber, interior piping and cover for column cap, factory assembled and tested ready for hookup to plumbing systems.

2.14 EMERGENCY SHOWER AND EYE-FACE WASH STATION

A. General: Freestanding emergency shower and eyewash fixture.

B. Accessories: Chrome plated bronze deluge shower head, self-closing valve, chain and strap, aerated eyewash with stainless steel bowl, hand and foot operated, stanchion, floor flange, and interconnecting fittings as required for complete installation.

2.15 WASH FOUNTAIN

A. General: Foot-operated 54 or 36-inch, circular or semicircular type as indicated, with supplies from above, centrally rising vent, with stainless steel shroud, a 13 gauge one-piece pressing polished stainless steel bowl, stainless steel pedestal and scuff base.

B. Accessories: Water saver sprayhead, metal powdered soap dispenser, thermostatic mixing valve, gate, strainer and check valves on hot and cold supplies and a restraining bracket for sprayhead support tube assembly.

2.16 DRAINS

A. General:

1. Provide drains with bottom outlet wherever possible. Use side outlet drains only where elevations of the connections do not permit the use of bottom outlet drains.

2. Provide suitable clamping devices on drains for securing membranes or flashings.

3. Provide drains with threaded or caulked connection, except for drains installed in conjunction with a metallic waterproofing membrane which shall be of polyethylene with accepted corrosion resisting screws for securing clamping device.

B. Floor Drains in Public Areas: Cast iron body, with flange and seepage openings, inside caulk outlet, and nickel bronze strainer. Provide square strainer for ceramic tile floors and round pattern for other finishes.

C. Floor Drains in Equipment Rooms: Heavy duty, cast iron, with round flat cast iron grate, flange with seepage openings, and caulk outlet.

D. Area and Vent-Shaft Drains: Medium duty, all cast iron, with flat cast iron grate as indicated, flange with seepage openings, and caulk outlet.

E. Roof Drains

1. Type A: Large area low profile cast iron dome, cast iron body, with combined flashing collar and gravel stop, bronze expansion joint, under deck clamp and spigot or inside caulk outlet.

2. Type B: Large area low profile cast iron dome, cast iron body, with combined flashing collar and gravel stop, bronze expansion joint, with sump receiver, 10-inch wide gravel guard, angle bar type under deck clamp and spigot or inside caulk outlet.

2.17 TRAPS

A. Traps for Fixtures: Cast brass “P”-trap with cleanout.

B. Traps for Drains: Plain pattern trap having seal of not less than two inches and not greater than four inches. Provide 1-1/2 and 2-inch traps of heavy cast brass and all other traps of materials specified for the piping system to which they are connected.

2.18 CLEANOUTS

A. General: Use cleanouts turning up through architecturally finished floors made of a long sweep ell two-1/8 bends or Y and 1/8 bend and machine finished brass plate of sufficient diameter to cover opening in floor with cleanout plug having solid head tapped for 1/4 inch brass machine screw to secure the cover plate.

B. For Cast Iron Bell and Spigot Pipe: As specified in Section 15050.

C. For Cast Iron Threaded Pipe: FS WW-P-471, 125-150 round, Type 1. Provide recessed head where cleanout is required to be flush with the finished floor surface.

D. For Ductile Iron Pipe: Extra heavy brass plug in drainage fitting.

E. For Corrosion Resistant Nickel-Copper Steel Pipes: Extra heavy brass plug in drainage fitting.

2.19 VACUUM BREAKERS

A. Chromium plated brass, sized to provide an air area at least equal to piping served, and of type approved for use by Authorities having jurisdiction.

2.20 SHOCK ABSORBERS AND WATER HAMMER ARRESTERS

A. Plumbing and Drainage Institute Standard PDI-WH-201, all brass body with phosphor bronze bellows precharged with nitrogen and glycerine and ready for installation in the piping system.

2.21 BACKFLOW PREVENTION DEVICE

A. Construction: Reduced pressure type with two or more tight-closing check valves, an automatic differential valve located between the check valves, two shut-off valves, strainer, and necessary appurtenances for testing. Installation suitable for minimum working pressure of 125 psig.

B. Performance: A low pressure zone between check valves shall be at least two psi lower than supply line pressure at all supply line pressures above two psig. When supply pressure drops below two psig, a relief valve shall open to discharge backflowing water to atmosphere. In the event of failure of any part vital to prevention of back-flow, the relief valve shall automatically emit a continuous discharge.

C. Materials

1. Body and Trim: Bronze.

2. Moving Parts: Corrosion-resisting steel.

3. Springs: Corrosion-resisting steel or bronze.

4. All Other Parts: Construction of corrosion-resisting material.

2.22 ELECTRIC WATER HEATERS

A. General: Electric, UL listed, with minimum storage, heat input, and heat recovery capacities indicated. Provide with magnesium anodes and cold water drop tubes. Comply with performance efficiency requirements of Part 1 “Submittals” Article herein.

B. Heater Tanks: Steel, constructed per ASME Code, glass-lined. Minimum working pressure 125 psig. Hydrostatically tested to 300 psig.

C. Jacket: Factory enameled steel with insulation to meet requirements of Part 1 “Submittals” Article herein between tank and jacket.

D. Heating Elements: Immersion type or strap-on type, which can be easily removed without draining tank.

E. Controls: Sensitive, close tolerance, immersion type control thermostat. Provide modulating step control actuating magnetic contactors. Furnish with heater prewired to solderless terminal lugs in control panel mounted on vessel.

F. Relief Valves: On each heater, install ASME labeled, Massachusetts approved, and BTU rated temperature and pressure relief valves sized for maximum heat input to heater.

2.23 SUBMERSIBLE SUMP PUMPS

A. Provide pumps vertically mounted centrifugal type conforming to MIL-P-28607, Type II, Class and Style as indicated, except provisions for location and fitting arrangement of discharge connection shall not apply. Provide discharge connection located and fitted so that a direct-connected length of straight pipe will extend in vertical direction upward. Additionally, provide each pump with liquid level control switch.

2.24 SEWAGE PUMPS

A. General: Provide sewage pump units capable of being mounted in sumps as indicated.

B. Pumps:

1. Provide wet-pit centrifugal duplex or simplex pumps conforming to MIL-P-21251, each having minimum capacity rating at head as indicated.

2. Provide pumps of iron, bronze fitted, construction with stainless steel pump shaft or high carbon steel pump shaft with stainless steel pressed sleeve, and flanged discharge connection.

3. Stainless steel for pump shafts and pressed sleeves shall be any 300 Series type.

4. Provide totally enclosed pump impellers capable of passing three-inch minimum size solid sphere during operation.

C. Motors: Provide pump motors designed for operation on electrical power having characteristics as indicated, having drip-proof type enclosures and NEMA Type 1, general purpose control enclosures.

D. Controls: Provide float-actuated sensing device with warning light and audible alarm.

E. Connections: Size and location of the sump sewage connections shall be as indicated.

PART 3 – EXECUTION

3.1 INSPECTION

A. Inspect previously completed work prior to starting the work specified in this section to ensure compliance with the Contract Documents.

B. Inspect surfaces to receive caulking and sealants, weldments and finishes and remove any contaminants, which would prevent adherence of the applied materials.

3.2 INSTALLATION

A. Install plumbing systems in accordance with Sections 15050 - BASIC MATERIALS AND METHODS FOR MECHANICAL WORK and as indicated.

3.3 DEFECTIVE OR DAMAGED WORK

A. Replace or repair damaged or defective work at no additional cost to the Authority. Retest required work and obtain acceptance of the Engineer prior to system use. Repeat water system sterilization whenever original clean status is voided.

3.4 ADJUSTING AND CLEANING

A. Clean fixtures and trim just prior to acceptance.

B. Clean out strainers and aerators.

C. Adjust and replace washers to prevent leaks at faucets and stops, as required.

D. Adjust pressure at drinking fountains to provide proper flow stream.

E. Adjust temperature of chilled water at each fountain in accordance with manufacturer's instructions and as indicated.

F. Adjust temperature and pressure of hot water system, and balance system.

3.5 FIELD QUALITY CONTROL

A. General:

1. Test plumbing system in accordance with Section 15050 - BASIC MATERIALS AND METHODS FOR MECHANICAL WORK, and requirements and as specified herein.

2. Prior to performance of plumb tests, confirm that specified piping disinfection has been completed.

B. Disinfection:

1. Disinfect potable water system prior to use as required by the agency having jurisdiction. Follow method that is prescribed by the health authority or, in case no method is prescribed by them, in accordance with requirements of Part 1 “Submittals” Article.

2. Obtain approval prior to further use of the water system.

C. Test of Installed Fixtures:

1. Test each installed fixture to confirm proper functional operation for purpose intended, as shown on the accepted Working Drawings.

2. Correct any defects, replace and repair defective work at no additional cost to the Authority. Retest as required.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Plumbing systems will be measured as per each complete in place, including all preparation, fixtures, accessories and incidentals.

4.2 PAYMENT

A. Payment for plumbing systems will be made at the Contract unit price for the quantities as specified above.

4.3 PAYMENT ITEMS

ITEM NO.	DESCRIPTION	UNIT
1501.001	PLUMBING	EA

END OF SECTION